GEOGRAPHICAL RECORD

NORTH AMERICA

The Economic Causes of New York's Supremacy as a Port. In the *Greater Port of New York Supplement* of the *New York Evening Post* for June 20, 1917, Professor Emory R. Johnson reviews the economic factors operating in the growth of New York as a port. In 1797, when the exports of New York state first exceeded those of Pennsylvania, New York became the first port of the country. Since that date the state and the city have always occupied the premier position in import trade, and only for a limited period in the thirties and the forties has New York been ousted from the first place in the list of exporting states. The temporary superiority of Louisiana gained by the cotton trade and Mississippi navigation had been eclipsed even before the Civil War created a unique opportunity for the ports of the North. Prior to 1860 New York owed much to her coastwise trade. Primarily this rested on her splendid geographical advantages—an excellent harbor, a central location between the manufacturing Northeast and the agricultural South and a direct water route via the Erie Canal to the West. In 1825 the port registered the arrival of 4,000 coasting vessels against 1,400 from foreign ports.

To New York the Civil War brought a trade increase both absolute and relative. Closure of the Mississippi route turned traffic east via the railroads and the Great Lakes and the Erie Canal and thus concentrated commercial movement on New York to an unprecedented extent. Tonnage on the canal in 1862 was double that in 1859. A part of this remarkable increase, due, as it was, to an outside and temporary cause—grain failures in England—also helped permanently in the consolidation of New York's foreign commerce. Of the entire country's exports in 1860 New York claimed 24 per cent: a decade later the city's share had risen to 50 per cent. Retardation of progress in the South and expansion in the Middle West continued to give the advantage, with few counterbalancing influences.

In recent years, however, a tendency towards decentralization has arisen, and New York's share of both import and export trade has been diminished, the former to about 55 per cent, the latter to 35 per cent, though last year's trade, with its vast export of war material, shows a return to the proportion of three decades ago. At the same time the absolute gains have been large. Even before the war New York had become the greatest world port in respect of tonnage, outranking London in both 1912 and 1913 (compare the article by O. P. Austin in the same issue of the *Evening Post Supplement*). Nor is the city's ultimate supremacy menaced. Diversification and territorial spread of industry and the acquisition of new markets in South America and across the Pacific are offset by certain advantages: superior transportation facilities, a vast reservoir of diversely skilled labor, and the cumulative effects of established financial leadership and commercial organization.

Immigration after the War. In 1914 the surplus of alien immigration over emigration contributed over 900,000 souls to the population of the United States. In 1915 and 1916 combined it has not reached one-third of this figure. The future course of the movement is a matter of interested speculation. To secure a basis of prediction the United States Chamber of Commerce recently sent out a questionnaire to various organizations in close touch with the country's alien and naturalized residents (*Information*, March, 1917, New York). Replies in response to it indicate opinion strongly tending to the belief that immigration will be resumed in volume at the close of the war, though it may be some time before the high pre-war figures are again reached. A large exodus of people going to the relief of distressed relatives is also anticipated, but it is believed that this outward movement will be temporary only.

Rainfall and Agriculture in the United States. One of the papers mentioned by Professor Ward in the bibliography at the end of his article in this number of the *Review* is of special and present interest, as it deals with the relations between agriculture and rainfall in the United States (B. C. Wallis: Rainfall and Agriculture in the United States, *Monthly Weather Rev.*, Vol. 43, 1915, pp. 267-274). The states are grouped, first on the basis of rainfall, secondly, on the basis of agriculture. On the latter basis the groups are named The Cereal States; The Cotton States; The Northeastern States; The Central Eastern States; The West Coast States; The Mountain States. The mixed nomenclature indicates the difficulty of devising a systematic agricultural grouping.

By means of tables the periods of sowing and reaping the principal crops are clearly shown. The shortness of the growing season in the Northern States stands in sharp contrast to the longer season in the South. Many interesting deductions are made, among them: "(1) Harvesting operations do not generally occur in the month of greatest rainfall; (2) Generally the summer crops are sown just preceding the wettest season and the winter crops just following it."

Other sets of tables bring out the comparative production of the principal crops as well as the relation of length of growing season and amount of rainfall to successful crop production. The rank of a state is determined by computing the production of a crop per square mile of the total area. On this basis Indiana is classed as the best winter wheat state in the Union. Another interesting deduction is stated "that the growing period of maize in the cotton states is very prolonged and this should be associated with the very poor yield per acre which is obtained." This statement implies a causal relation which is to be doubted in view of the fact that larger yields per acre of corn have been produced in some of the Southern States than in the states of the corn belt. Although the methods employed of computing agricultural rank of the states and some deductions from the data submitted are open to question, the paper presents much very valuable material. N. A. BENGTSON.

Hail in the United States. As a fitting supplement to recent Weather Bureau work on the origin, mechanism, and distribution of thunderstorms, Professor A. J. Henry has made a study of hail in the United States (*Monthly Weather Rev.*, Vol. 45, 1917, pp. 94-99). The compilation of hail statistics upon which this investigation is based was undertaken because of the immediate necessity for a knowledge of the approximate frequency of hail in this country. An earlier attempt (*ibid.*, Vol. 26, 1898, p. 546) was not wholly successful because the data then available were incomplete. The new chart of annual hail frequency shows that the region of most frequent occurrence (four or more storms a year) is in southeastern Wyoming and eastward therefrom, including the western portions of Kansas, Nebraska, and Oklahoma. Adjoining this region, especially to the eastward, the average number of storms per annum decreases to three over practically all of South Dakota, Nebraska, Kansas, the western and central portions of Iowa, the northwestern third of Missouri, all of Colorado, and the southeastern portion of Wyoming. East of the Mississippi the annual average is two storms a year. A second region of hail frequency is found in southwestern Montana and southern Idaho and the mountain districts of New Mexico and northern Arizona.

Hail is in general a phenomenon of the warm season. The only notable exception is the immediate Pacific Coast from San Francisco northward. There hail occurs chiefly in November to March. In the warm season, hail is closely associated with thunderstorms and tornadic phenomena. Practically no damage to agricultural crops by hail is possible in the Pacific Coast States, and only small damage is possible in the Gulf States, both by reason of the infrequency of the phenomenon and the absence of crops at the time of greatest frequency. One hail insurance company in Iowa has, during the last twenty-four years, paid on an average $77,525 a year for hail losses. Professor Henry's paper is illustrated by means of five charts, showing the average number of days with hail, by seasons and for the year, for 1906-1915. R. DEC. WARD.

East Indians in the West Indies. It is not perhaps generally appreciated that to the already mixed racial composition of the West Indies a new element is steadily being added. For some years past in fact the increase of population in Trinidad and British Guiana has been due almost entirely to immigration from India. In British Guiana the census of 1911 showed 126,517 of East Indian origin out of a total of 296,041. Trinidad, with a total population of 333,552, numbered 108,606 of the same origin, and in other islands the proportion of this element is increasing to a degree whereby it promises to hold the majority at some time in the future. Practically all the East Indians come out under contract with the West Indian governments as indentured laborers to work on the sugar and cacao plantations. Their contracts bind them for five years, but they are also required to remain in the colonies for another five, during which they are free to take up land or to work for whom they please. As a body they have gained a reputation for hard work and thrift. During the period of indenture many of them save enough money to purchase land, and the number of land owners among them grows steadily. The common procedure is to buy a few acres of forest land from the government, clear it and plant it with cacao or coconut trees, utilizing the space between the trees for "ground provisions." When the trees begin to bear, in five or six years time, his little property assures the owner an independence (Watson Griffin: Canada and the British West Indies: Report on the Possibilities of Trade under the Preferential Agreement, Chapter 8, Department of Trade and Commerce, Ottawa, 1915).

An Eruption of Poás Volcano, Costa Rica. C. T. Mason publishes in *Dun's Review (International Edition)* for January, 1917, a set of five photographs illustrating an eruption of Poás volcano, a phenomenon whose occurrence has been seldom recorded. Poás volcano (8,785 feet in elevation) occupies a central location in the volcanic chain of northern Costa Rica. The active crater, a large circular basin, holds a lake of turbid green water of high temperature and strongly sulphuric. The ordinarily placid surface of the water is disturbed at irregular intervals by geyser eruptions of varying degrees of intensity. According to Pittier (Kostarika: Beiträge zur Orographie und Hydrographie, *Petermanns Mitt. Ergänzungsheft No. 175*, pp. 13-14, 1912), the column of water thrown into the air during an eruption of 1888 only reached a height of 6 to 9 feet, while during a period of seismic activity in the succeeding year he himself witnessed an eruption in which the column ascended to 230 feet and lasted for 15 to 19 minutes. (For an account of the volcano and its activities see also Karl Sapper: Die mittelamerikanischen Vulkane, *Petermanns Mitt. Ergänzungsheft No. 178*, pp. 112-117, 1913; for a description of a visit after the eruption of 1910 see A. S. and P. P. Calvert: A Year of Costa Rican Natural History, New York, 1917.)

At present access to Poás volcano is difficult, but a road 30 miles long would put it into communication with San José and open up a district with considerable possibilities as a tourist and health resort.

EUROPE

Audibility of Gun-Firing Over the Southeast of England. Messrs. Miller Christy and William Marriott have investigated the audibility, in England, of the gun-firing in Flanders, and also the meteorological conditions under which the firing was heard (*Quart. Journ. Roy. Meteorol. Soc.*, 1916, pp. 267-285). The observations were made in Essex County, in southeastern England, about 125 miles northwest from Ypres, that being taken as a fairly central point in Flanders around which there has been exceptionally severe land fighting. The point of observation was about 155 feet above sea level, without any higher ground in the immediate vicinity. In fact, there is no higher ground between this point and Ypres. The observations were continued during a period of eight months. The maximum distances at which the firing has been heard seem to be about 220 miles from the firing line, during the great British "push" in July, 1916, and about 300 miles on two other occasions, once during the naval battle in the North Sea, January 24, 1915, and again at the time of the naval battle off Jutland Bank, May 31, 1916.

A study of the meteorological conditions shows that gun-firing was most frequently heard where there was a light or moderate breeze blowing between north and east and when the sky was cloudy or overcast. The most favorable pressure conditions are those when there are irregular or poorly defined areas of relatively low pressure with a slight elevation of pressure between them. Calms or light airs then prevail at the surface, while the upper currents may be moving faster than the lower and from a slightly different direction. Under these conditions the sound waves are probably refracted in the upper currents and reflected downwards to great distances. The popular superstition that heavy gun-firing brings rain may possibly have its source in the fact that conditions favorable for audibility are also conditions favorable for heavy rains of a thunderstorm type.

R. DEC. WARD.

The Project of Draining the Zuider Zee. In January, 1916, North Holland suffered a flood disaster from the Zuider Zee said to be the worst on record since 1825. The catastrophe greatly revived interest in the ancient, much discussed project of draining the waters of the inland sea, and now a bill for the purpose has been introduced before the Netherlands Parliament. The project calls for the construction of a dam from the northern end of the province of North Holland via the island of Wieringen to the coast of Friesland. Including the island, the length of the proposed dam will be 24 miles: it will cut off 882,000 acres of the upper waters of the Zuider Zee and of these it is proposed to drain some 500,000. The time required for complete execution of the undertaking is estimated at fifteen years and the cost of the dam, drainage, and various protective works is placed at $90,000,000. The measure is complicated by the number of diverse interests involved. Among other considerations it must take into account indemnification of the fishing and shipping activities that will suffer thereby (*Commerce Repts.*, Jan. 19, March 30, Oct. 11, 1916, and March 9, 1917).

ASIA

Completion of the Amur Railroad. Passengers from Vladivostok to western Russia need no longer make use of the Chinese Eastern Railway section of the Trans-Siberian line: the all-Russian route has now been completed by the opening, in October, 1916, of

the Kabarovsk bridge (*China Maritime Customs Statist. Series Nos. 3 to 5 (Returns of Trade and Trade Repts.)*, 1916, Part 2, Vol. 1, Shanghai, 1917, p. 8). This great bridge, one of the longest in the world (8,523 feet), crosses the Amur where the railroad turns south to leave the basin for Vladivostok (compare note on "Siberian Traffic Problems," *Geogr. Rev.*, Vol. 1, 1916, p. 461).

A Flood Survey of the West River in Southern China. The Canton delta and the lower Si-kiang, or West River, in southern China were the scene of disastrous floods in June, 1914. At Wuchow the waters rose 22 feet in twenty-four hours. A year later a survey was undertaken for the regulation of the river, particular attention being paid to the region between Wuchow and the sea. Parts of the report submitted by the chief engineer, Captain G. W. Olivecrona of the Swedish army, to the Board of Conservancy Works at Kwantung, are reprinted in the April, 1917, issue of the *Far Eastern Review* (pp. 413-417). This account is of interest because the occasion was the first on which the hydrography of the region was systematically investigated by a staff of foreign engineers.

Rising in eastern Yunnan, the West River first flows south, receiving additional waters from rivers originating in the lakes of the Yunnan plateau, and then northeast, to the meeting point of the boundaries of Yunnan, Kweichow, and Kwangsi. Down to this point it is known as the Pa-ta-ho. From here it flows east along the frontier between Kweichow and Kwangsi and then southeast and east-southeast across Kwangsi province to Sünchow (110° E.), during which part of its course it is called Hungshui, which means "red water," from the color of its silt. Finally in its lower course it becomes the Si-kiang, reaching the sea in four branches known as Junk Fleet, Motomoon, Futinmoon, and Ngaemoon. Except in its last stretches and for a distance of about 90 miles above its mouth the river and its tributaries flow through rugged country. Its drainage basin covers an area of 130,000 square miles.

Of the tributaries, the Liu Kiang is the largest on the left. Its width and depth at the point of confluence are greater than those of the Hungshui, and for this reason it has sometimes been mistaken for the main river. But in the opinion of the surveying commission, the Liu Kiang is to be considered as a tributary, albeit the larger, because the length and the drainage basin of the Hungshui are greater. Another important left tributary is the Pepan-kiang. The major right affluent is the Yu-kiang, which joins the West River at Sünchow; it is navigable to Nanning (108° E.) all the year for shallow-going motor-boats and junks and for nine months as far as Poseh (106° E.).

To prevent flooding of the low country the commission recommended that the present dyke system be improved by additional construction and that the dykes be maintained to a sufficient elevation. Much of the economic prosperity of the Canton delta depends on the control of the rivers which reach it. The upper reaches of the affluents of the West River are subject to heavy rain storms which cause great accumulation of water. To regulate this excess is the problem which the Board of Conservancy Works at Kwantung is trying to solve and for which the surveying and hydrographical observation work was carried on.

The Proposed Indo-Ceylon Railway. A continuous railway net extending from north of the Arctic Circle (Narvik, 68½° N.) to within six degrees of the equator (Pointe de Galle) may become an accomplished fact if, in addition to the proposed connection of the European and Indian railway systems, discussed in Mr. Baker's article in this number of the *Review*, the projected linking of Ceylon with the Indian mainland is carried out (*Engin. Suppl. of the London Times*, Jan. 26, 1917, p. 35, based on a paper by F. J. Waring before the Institution of Civil Engineers). Recent extension of the South Indian Railway to the eastern point of Rameswaram Island and of the Ceylon Railway to the western point of Mannar Island leaves between the two systems a gap of little more than twenty miles. The possibility of closing the gap is suggested by the existence of the well-known Adam's Bridge. Superficially the bridge is of sand, in part above water level and for a portion of its length overlying rock at no great depth. It divides the shallow channel of Palk Strait from the comparatively deep Gulf of Mannar. Water levels in the two channels vary according to the action of the strong, steady monsoon winds which blow alternately in opposite directions against the bridge. In conjunction with the asynchronous tides a maximum difference of 18 inches is established between the levels on either side of the bridge. The action of the local currents thus set up is complicated, and the railroad engineer has to face an interesting problem.

HUMAN GEOGRAPHY

Telephone and Telegraph Development as an Index of National Culture. Civilization advances by the interchange of products—material and spiritual. Measure-

ments of the degree of or facility for interchange are indices of civilization. In a suggestive paper, "The Culture of the Nations" (*Bull. Amer. Geogr. Soc.*, Vol. 43, 1911), Jefferson selected four such indices to arrive at an estimate of world civilization, and on its basis he classified 69 countries into four cultural classes. The indices were schooling, commerce, development of railways, and use of the mail. With his conclusions, though based on statistics of earlier date, the latest available telephone statistics make interesting comparison (Telephone and Telegraph Statistics of the World, January 1, 1914, Amer. Telephone and Telegraph Company, New York City).

The fifteen countries ranked by Jefferson in the highest class all have a comparatively highly developed use of the telephone. All have 50 or more telephones to 10,000 population and most of them have over 150. Countries of the lowest culture, including all Africa except Egypt and the Union of South Africa and Asia except Japan and Asiatic Russia, have only 2 or less telephones per 10,000 inhabitants. Telephony also has made little headway in South American countries falling in the lowest rank—Bolivia, Peru, and Colombia with 10 per 10,000. At the other end of the scale in South America are Argentina and Uruguay. Uruguay has 100 telephones per 10,000 population, Argentina 90. In these two countries, unlike the remainder of the continent, the pure Indian element is practically non-existent.

Of greatest interest is the telephone distribution in the countries of the first rank. Most striking is the leadership of the United States, where internal commercial movement is also great. The United States has 970 telephones to the population unit. Canada is second with 650. Distribution in these countries may well be compared with Huntington's maps of the distribution of civilization and of human energy on the basis of climate ("Civilization and Climate," New Haven, 1915, p. 200). The first practical telephone was an American invention.

Besides Canada other British colonies with responsible government make a good showing in telephone usage. In these new countries, where other means of communication are not yet well developed, the telephone and telegraph assume special importance. The latter in particular figures with a high proportional development where there are great areas scantily populated. In this relative development of the telegraph Canada leads with 250 miles of wire to 10,000 population; New Zealand has 240 miles and Australia 220. The United States has 190 miles and Argentina, where the progress of colonization bears many resemblances to that of the Anglo-Saxon type, has 160 miles per population unit. All greatly exceed figures in Europe.

Turning to telephone statistics in Europe we find a surprisingly high development in the Scandinavian countries. Denmark has 450 telephones per 10,000 people; Sweden 410, Norway 340. Here are countries which are adapted both through race and geographic position to very high cultural rank. In Jefferson's scale, however, Norway and Sweden appear at the end of the first class. This is largely due to the comparatively feeble development of their railways, itself attributable to difficult physical conditions. On the contrary an enterprising and well-educated people is ready to take advantage of an appropriate means of communication. The progress of telephony has been closely followed by the Scandinavian countries. For several years Stockholm has led the world's cities in the number of telephones per capita: today the number per 10,000 population is 2,410, where for the twelve largest cities of the United States it is 1,130. In proportion to the figures for these northern countries the number for France, 80 per 10,000, seems remarkably low. Here, however, as in Great Britain, the employment of telephone service met considerable opposition from the well-developed telegraph systems. In France there is a higher proportional development of the latter than in any other European country.

GEOGRAPHICAL NEWS

Meteorological Bibliography. Those who need to use current meteorological bibliographies will be interested to know that a change has been made in the bibliography regularly published in the *Quarterly Journal of the Royal Meteorological Society*. Beginning with the issue for January, 1917, the subject-headings and numbers used in the "International Catalogue of Scientific Literature" have been adopted. This is a distinct improvement over the method previously followed in this publication, which was purely alphabetical. R. DEC. WARD.

OBITUARY

DR. ROBERT BELL, associated with the Geological Survey of Canada since 1857 and its director from 1901 to 1906, died on June 18 at Rathwell, Manitoba, in his seventy-sixth year. For a period of over forty years he was actively engaged in the geological